

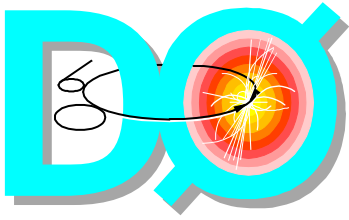
# INSTPHYSCOM WG 2

## L1CALTRK & CTT Commissioning Plan

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- L1CALTRK
- CTT upgrade
- Open questions

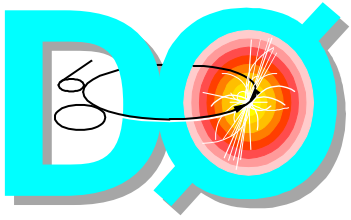


## L1CALTRK

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- Ken presented plan at 1<sup>st</sup> WG meeting (see agenda server)
- System very similar to existing L1 MUON hardware
- Receives inputs from calorimeter and CTT
- Infrastructure: power supply mods, cable install and termination, support and control software adaptation
- Board production and testing: well established procedure
- Commissioning of new crates is multi-step bootstrapping process:
  - Install crates, populate with known good boards (first old, then new)
  - Establish BOT triggers to TF using known good (L1MUON) inputs to new crates
  - Establish L3 readout of new crates
  - Repeat using CTT inputs
  - Repeat using L1CAL inputs
- Develop trigger algorithms in parallel; some already exist
- Worry: manpower beyond 2005; try to frontload as many tasks as possible (Fall 2004 shutdown and early 2005)

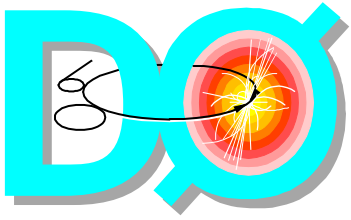


## L1CALTRK: Software Status

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- Much of the software needed will result from modifying existing L1MU software including
  - Control and FPGA downloading
  - Online monitoring
  - Trigger term downloading (COOR)
  - Offline analysis
    - Expect significant progress this summer on all
- Simulation
  - Work is in progress on two fronts
    - L1CalTrack ROOT macros
      - Using L1Cal and L1CTT root-tuples as input
    - Full tsim\_l1caltrack
      - For this we need inputs from tsim\_l1cal and tsim\_l1ctt running in tsim\_l1l2 (not yet available)

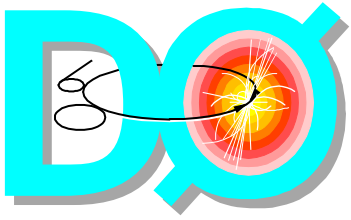


# Commissioning Plan

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- Step A
  - JTAG boundary scan and bench testing
- Step B
  - Integrate L1CalTrack crates into the experiment using L1MU hardware and (a few) spare inputs
    - Triggers to L1, readout to L3, offline analysis, ...
    - Goal is to complete Step B by August 2004 shutdown
- Step C
  - Repeat Step B using L1CalTrack hardware
- Step D
  - Repeat Step B using L1Cal and L1CTT inputs

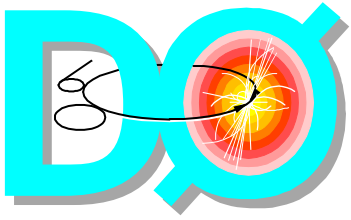


# Infrastructure Status

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- VME crates, processors, MRC
  - Installed
- VME crate power supply
  - In hand but hold-up in testing
  - Alternate test procedure being pursued
- Cables
  - Collision hall to MCH1 cables run but not terminated
  - Onboard and L1CTT transition cables not terminated
  - Most of the above termination work should occur this summer (Fermilab technicians)
  - Cable termination inside collision hall planned for August 2004 shutdown

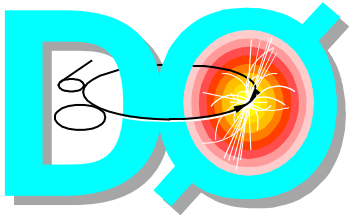


## Other L1CalTrack Work

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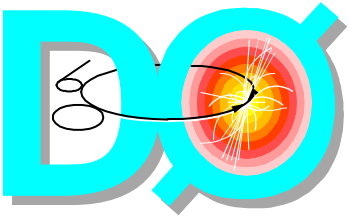
- To accommodate latency introduced by ADF processing, when the upgraded L1Cal trigger is brought online the overall L1 trigger latency must be increased from 3300 us to 4092 us (6 BC ticks)
  - Pipelines in calorimeter, silicon, CFT can accommodate this increase
  - PDT and scintillator front-ends must be modified
    - Mostly firmware mods but the PDT FEB's must be removed from the collision hall
    - We should push to fully test these mods before the August 2004 shutdown
    - We should push to accomplish these mods during the August 2004 shutdown



# L1CalTrack Task List

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Task	Duration	FTE
Pre-commissioning using L1MU cards (step B)	4 mo	1
Pre-commissioning using L1CalTrack cards (step C)	6 mo	1
Pre-commissioning using L1Cal and L1CTT inputs	4 mo	1
Infrastructure tasks	4 mo	1 Phys, 2 Techs
Online software tasks	6 mo	1
Offline software tasks	6 mo	1
Simulation tasks	12 mo	1
Beam commissioning	6 mo	2

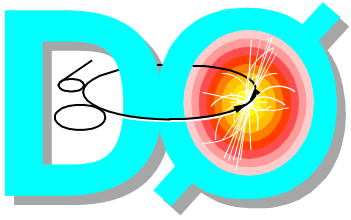


## L1CALTRK Conclusions

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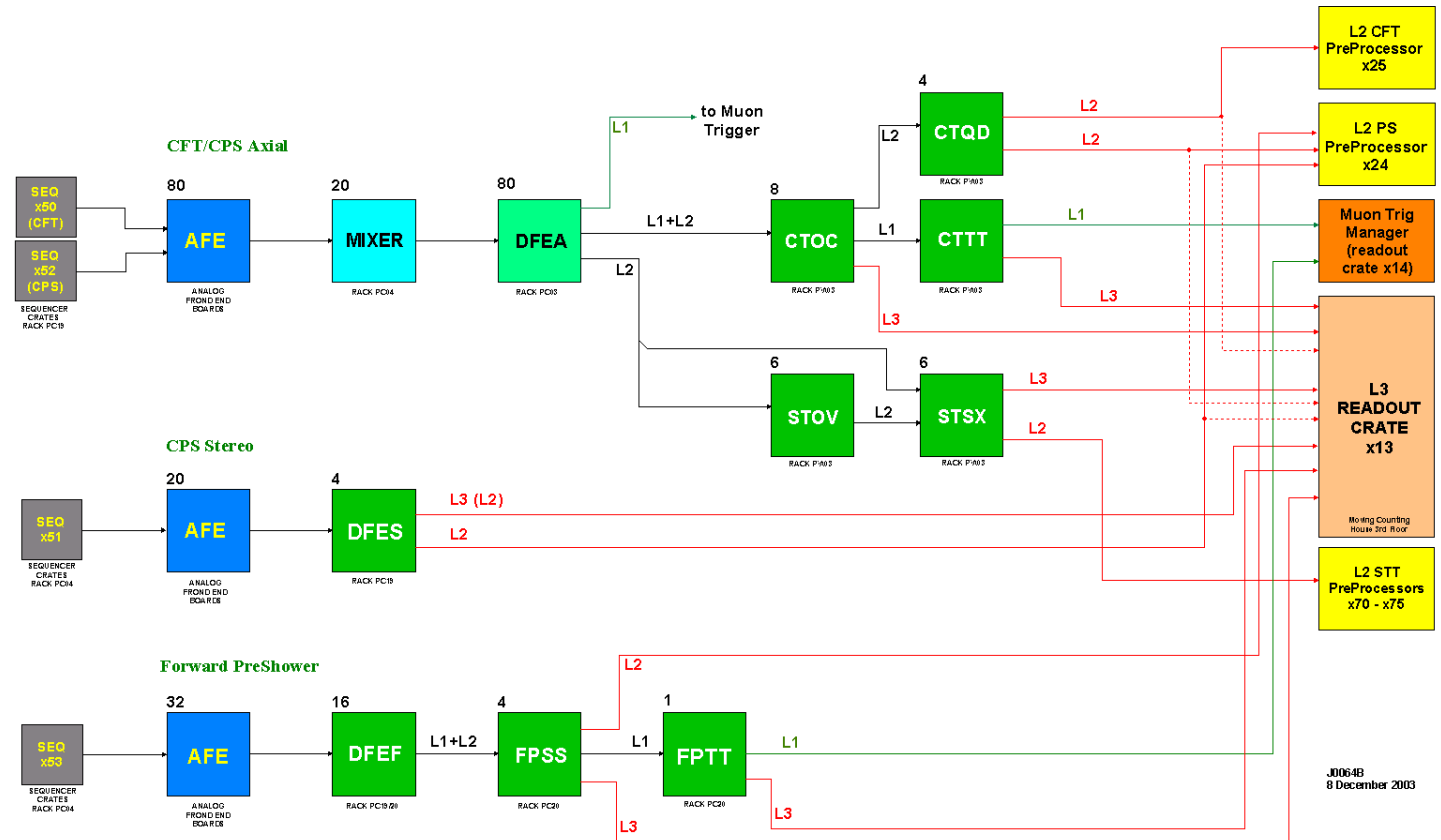
- L1CalTrack hardware will be completed in early 2005
- We hope to have L1CalTrack crates integrated into the experiment (test triggers, readout) by August 2004
- Testing and modification of PDT and scintillator front-end boards should be a high priority of the August 2004 shutdown



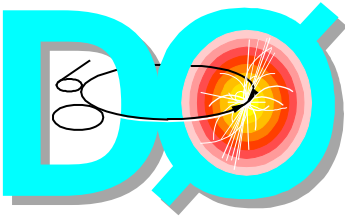
# CTT Upgrade: Overview

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- New DFEAs (DFEB ?)
- Sequence:
  - Standalone tests (enhanced by new I/O buffers on board)
  - Test stand (chain with few AFE/Mixer/CTOC)
  - Partial parallel chain on platform

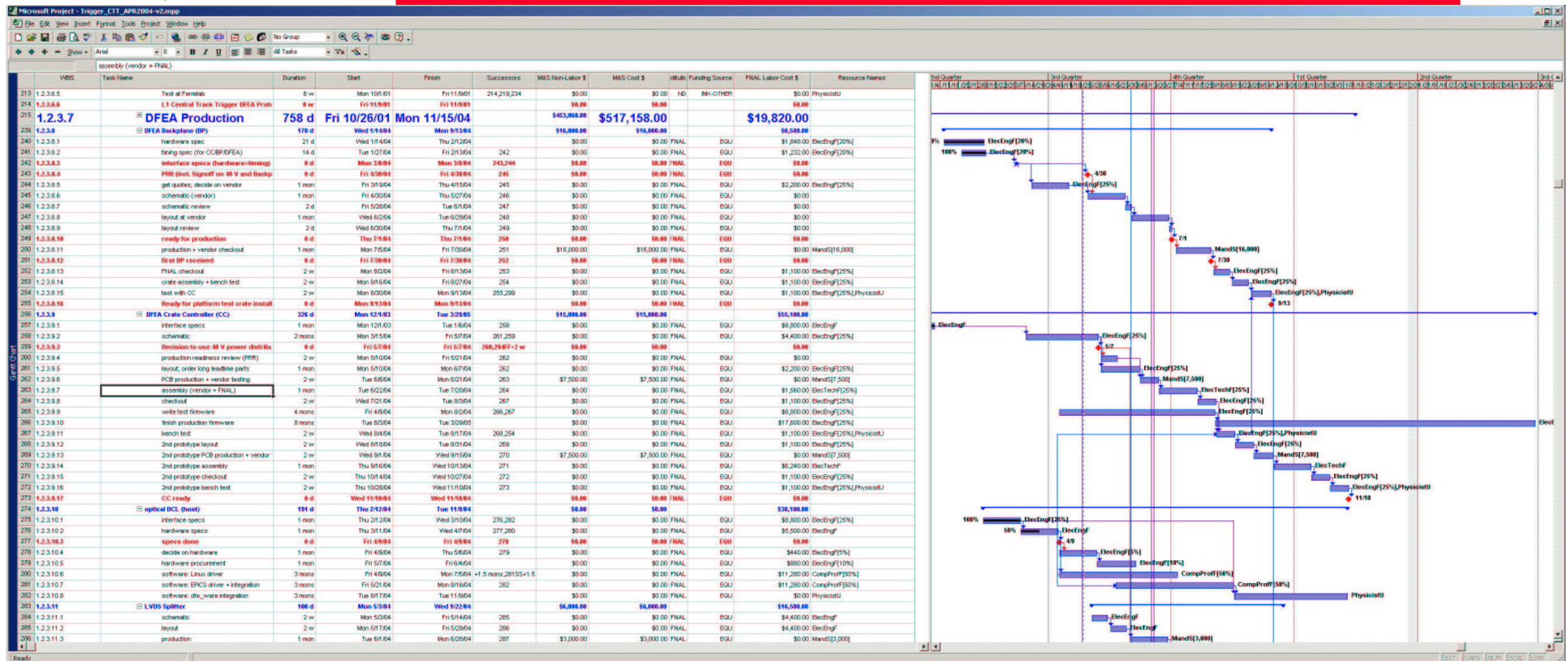


Parallel chain: (AFE-MIXER)-Splitter-DFEB-CTOC-(VRB in x13) and -CTTT-(VRB in x13)



# CTT Upgrade: Schedule I

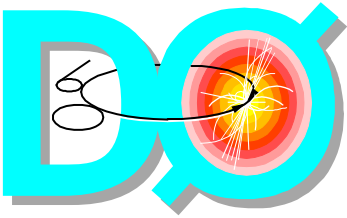
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- Not shown: sequence of DFAE prototypes (3) and DFAE production and testing. Progressing on (long established) schedule. Prototype 2 will be used on the platform in the Fall.

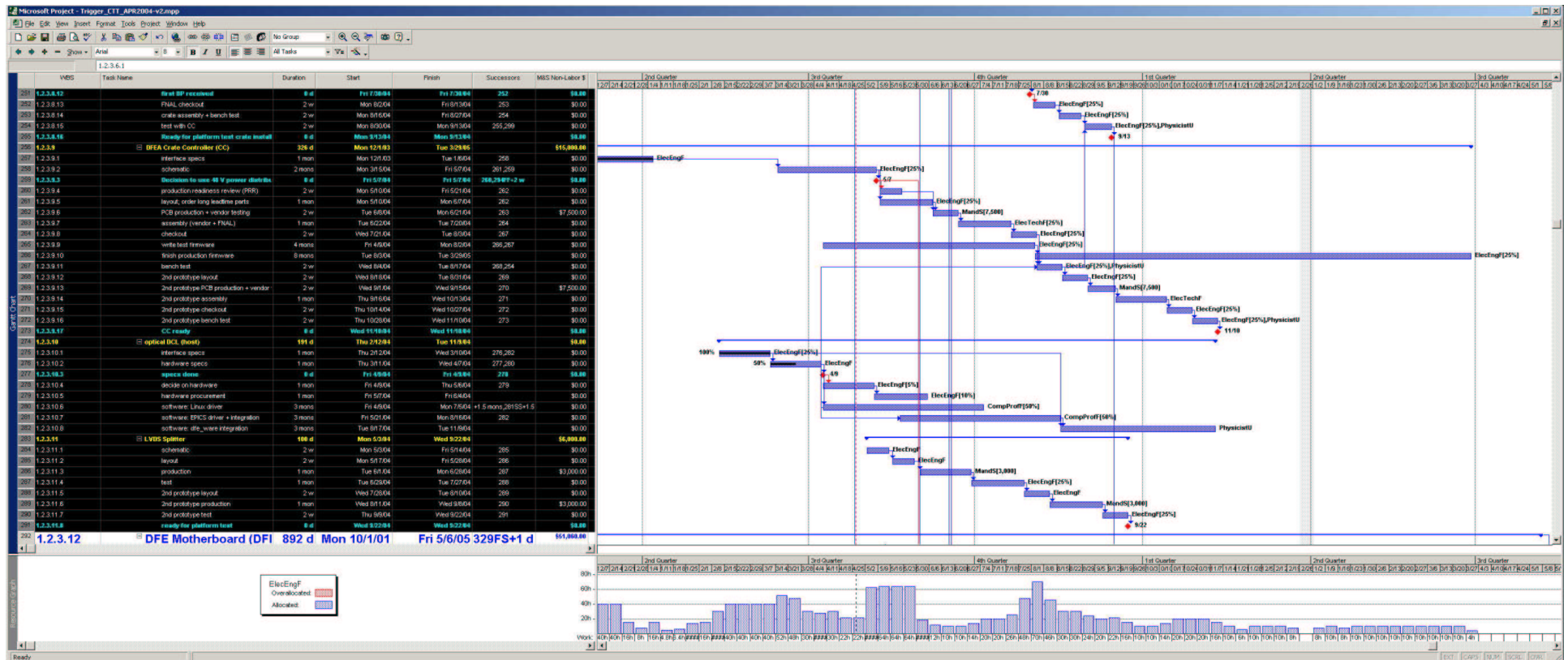
June 10, 2004

Stefan Grünendahl



# CTT Upgrade: Schedule II

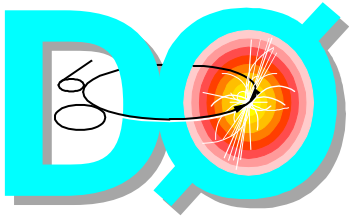
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- Backplane (new crate) and Splitter are the critical projects for installation in the Fall 2004 shutdown. Other boards (Crate Controller, DFEAs) can follow later.

June 10, 2004

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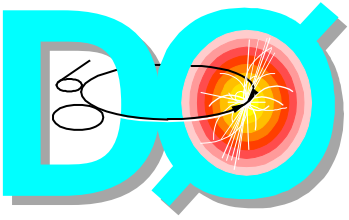


## CTT Upgrade: 'Commission/Install/Commission'

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- Try to offload as much as possible from commissioning after installation
- With partial chain and real data from the real frontend:
  - Test system level hardware issues
  - Verify ('certify') that current algorithms produce identical results on new hardware (part of this can be done offline by using I/O capture buffers on DFEBs)
  - Test and optimize (efficiency vs. rate) new singlet algorithms (again, can use capture buffers to get real data for offline tests)
- Populate two full crates, check in test stand
- Install (summer 2005); verify cabling
- If parallel chain tests were done right, there should be no issues left at this point. We either continue running doublet (old) algorithms until everybody (TB, physics groups) is happy with the 'operating point' of the new ones, or switch right away.



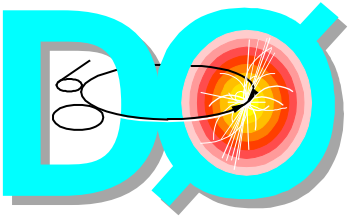
# CTT Upgrade: Manpower needed

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- Hardware (Boston+FNAL), Firmware (Boston) and equations (Kansas) **covered**
- Trigsim needs to be updated (Mike Hildreth, Carsten Hensel)
- AFE 'personality' (output mapping) (Makoto -> AFE II group ?)
- Mixer support (Makoto -> ?)
- dfe\_ware (download + FW bookkeeping) (Yurii M. -> Oana) **covered**
- ctt\_examine (Mike Cooke) **covered**
- CTT\_analyze (offline verification) (Yurii M., Makoto -> ?)
- CTT daily operation: current postdocs have to be (and are) moving on

Some of the infrastructure adaptations are needed for this Fall, and thus will have to be done by current experts, but we need new people to start 'learning the CTT' asap.

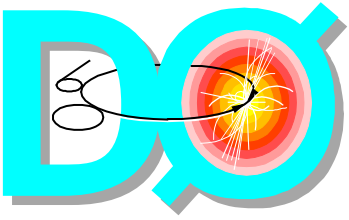


## CTT summary

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- Stefan presented plan at WG meeting (see agenda server)
- New system (2 DFEA crates from Boston) very similar to existing CTT
- Challenges: hardware not accessible in MCH; need to keep old system running
- Plan: establish parallel data path for prototype of new system on platform, and debug while still running the CTT with the old DFEA crates
- Fall 2004 shutdown: install and test splitter hardware and infrastructure (crate, backplane, cables, power supply, downstream modules) on platform
- Fall 2004 and later: multi-step bootstrapping of new system
  - Test new boards (Crate Controller, DFEB) (JTAG, 3<sup>rd</sup> floor test stand)
  - install tested prototypes in parallel system on platform (brief accesses)
  - Establish download and control; verify input handling; establish L3 readout; establish Trigger Framework connection; test trigger algorithms on platform
- Summer 2005: switch over to new system

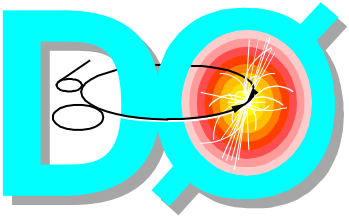


# CTT upgrade

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- Worries:
  - Manpower for adaptation of infrastructure and verification software
  - New firmware contributor (Boston)
- WG feedback:
  - Will hardware be ready? -> different committee...
  - Need to establish procedure to insure that new hardware will work for all existing CTT customers ('victims'), in particular STT (receives duplicate output)
  - Final replacement of DFEA crates, recabling and connection testing will still be challenging



## WG 2 Summary

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- L1CALTRK: lots of work, no showstoppers
- CTT: tight schedule for hardware; parallel operation of prototype system makes commissioning much more relaxed; lots of work adapting existing tools